(19) Japanese Patent Office (JP)

(11) Unexamined Patent Application No. 6-37076

(12) Unexamined Patent Gazette (A)

(43) Date of Publication: February 10, 1994

(51) Int. Cl.[5]	Class. Symbols	File No. FI	Technical Labels
H 01 L 21/304	321 M	8728-4M	
B 24 B 1/00	A	7528-3C	
49/04	Z	9135-3C	

Request for Examination: Not yet submitted Number of Claims: 2 Total of 4 pages [in original]

(21) Application No.: 4-188240

(22) Date of Filing: July 15, 1992

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(54) [Title of the Invention] Semiconductor Polishing Method

(57) [Summary]

[Means of Achievement] A jig to which the surface of a small semiconductor substrate is anchored inclined down is placed on a rotary polishing plate having both a mesh and transparent parts in the surface thereof and attached to rotary motor shaft 3 so that it engages with jig stationary rod 4 and touches the side of the semiconductor substrate; the surface of the semiconductor substrate is monitored by camera 13 from underneath the rotary polishing plate using the transparent part that is made when the transparent parts in the rotary polishing plate turn; coordinates on the semiconductor substrate are detected by video processing the image of the semiconductor substrate surface; and when the side of the semiconductor substrate reaches the preset polishing stop point coordinates, the motor automatically shuts down.

[Merits] It is possible to automatically reach the polishing stop point and to prevent exceeding the polishing stop point without calculating polishing time using optical microscopes or instrumentation. In addition, the present invention curtails polishing time and reduces the number of steps involved in polishing.

[Claims]

[Claim 1] A semiconductor polishing method whereby a specific amount of polishing is performed by pressing the side of a small semiconductor substrate to a rotary polishing plate attached to the shaft of a motor, characterized in that the surface shape of this semiconductor substrate is monitored and once this preset specific amount of polishing has been reached, this motor is automatically shut down.

[Claim 2] The semiconductor polishing method according to claim 1, characterized in that the surface of this semiconductor substrate is inclined facing this rotary polishing plate so that the side of this semiconductor substrate is pressed to this rotary polishing plate; there are transparent areas in at least part of this rotary polishing plate; and the surface shape of this semiconductor substrate is monitored from underneath this rotary polishing plate.

[Detailed Description of the Invention]

[0001]

[Industrial Field of Use] The present invention relates to a semiconductor polishing device that polishes the side of a small semiconductor substrate after semiconductor wafer dicing.

[0002]

[Prior Art] An oblique view of a conventional semiconductor polishing device is shown in Figure 5, and a cross section along line B-B' in Figure 5 is shown in Figure 6. Semiconductor polishing device 1 in Figure 5 has columnar water receptacle 10, water inlet 2, and jig stationary rod 4 on the main body. As shown in Figure 6, drive controller 11 and rotary motor 12 are held on the inside of the device, with shaft 3 of rotary motor 12 protruding at the center of cylindrical water receptacle 10. The front surface consists of display 5, drive control button 6, revolution speed control button 8, and water control button 9. Columnar water receptacle 10 is such that water is released to the outside on an incline. Jig stationary rod 4 is long, extending from part of the main body, and serrations are formed on the side. Display 5 is a liquid crystal display that displays the number of revolutions. The number of revolutions is changed with rpm control button 8 and the number of revolutions is sent to drive controller 11. Rotary motor 12 is controlled and shaft 3 is rotated by drive control button 6. Water control button 9 opens and closes water inlet 2 and water is introduced near jig stationary rod 4 during polishing.

[0003] Figure 7 is an oblique view of a jig to which a semiconductor substrate is anchored. The jig is mad of a metal material heavy enough to be heated. This semiconductor substrate is rectangular with wedge-shaped grooves in the center on one side. Polishing plate 15 in Figure 8 is disk-shaped and is a mesh over the entire surface. This mesh ranges from a coarse mesh to a fine mesh. Moreover, the polishing plate is glass-like and is made of quartz, and the like. Semiconductor polishing plate 5 is anchored, with the surface with the mesh facing up, to shaft 3 of rotary motor 12 that protrudes at the center of columnar water receptacle 10.

[0004] Once the surface of the semiconductor substrate has been anchored to the end face of jig 14 so that it projects down slightly from the base of jig 14, it is placed on top of anchored rotary polishing plate 15 as the wedge-shaped grooves on the side of jig 14 and the serrations in jig stationary rod 4 engage. Rotary polishing plate 15 is turned by rotary motor 12 and is polished when the side of the semiconductor substrate and the rotary polishing plate are brought into contact under the weight of jig 14.

[0005]

[Problems which the invention is intended to solve] Nevertheless, it is necessary to pre-measure the amount of polishing per unit in accordance with the number of revolutions of the polishing plate and the mesh type with the above-mentioned type of semiconductor polishing device. That is, polishing is initially performed at any number of revolutions and time, and the distance polished is measured by monitoring the surface of the semiconductor substrate with an optical microscope or another type of device. It is necessary to

calculate the time up to the polishing stop point from this distance and the number of revolutions. Moreover, if there are errors in the calculation, the polishing stop point will be exceeded. In order to prevent this exceeding of the polishing stop point, polishing time is marked with small notches and polishing is performed while monitoring the polishing point on the semiconductor substrate with an optical microscope and the like. This takes considerable time.

[0006] Therefore, the object of the present invention is to prevent overshooting of the polishing end point; make optical microscopes and instrumentation unnecessary; and curtail the polishing time.

[0007]

[Means for solving problems] In order to accomplish the above-mentioned objectives, the present invention is a semiconductor polishing method whereby a jig to which semiconductor substrate is anchored inclined (with the surface of the semiconductor substrate facing the rotary polishing plate) is placed on a rotary polishing plate with both a mesh and transparent parts, and the surface of the semiconductor substrate is monitored from underneath the rotary polishing plate using the transparent part that is made when the transparent parts in the rotary polishing plate turn.

[0008]

[Operation of the invention] By means of a semiconductor polishing device constructed as described above, coordinates on the semiconductor substrate are detected by video processing images of the semiconductor substrate surface, and when the side of the semiconductor substrate reaches the preset polishing stop point coordinates, the motor is automatically shut down.

[0009]

[Working Example] An oblique view of the semiconductor polishing device of the present invention is shown in Figure 1, and the cross section along line A-A' in Figure 1 is shown in Figure 2. Semiconductor polishing device 1 in Figure 1 has columnar water receptacle 10, water inlet 2, and jig stationary rod 4 on the main body. As shown in Figure 2, drive controller 11, rotary motor 12, and camera 13 are held on the inside of the device, with shaft 3 of rotary motor 12 protruding at the center of cylindrical water receptacle 10. The front surface consists of display 5, drive control button 6, revolution speed control button 8, and water control button 9, as shown in Figure 1. Columnar water receptacle 10 is such that water is released to the outside at an incline. Jig stationary rod 4 is long, extending from part of the main body, and serrations are formed on the side. Display 5 simultaneously displays the image photographed by the camera and displays the number of revolutions, the polishing position control lines, and the like. The polishing position control lines are changed by polishing position control button 7, and the number of revolutions is changed by revolution speed control button 8. The image of the surface of the semiconductor substrate monitored by camera 13 is sent to drive controller 11 and processed to detect the coordinates on the semiconductor substrate.

[0010] Moreover, the number of revolutions and the coordinates of the polishing position control lines are sent to drive controller 11. Rotary motor 12 is driven and controlled and shaft 3 is turned by drive control button 6. Water inlet 2 is opened and closed by water control button 9 so that water is introduced near jig stationary rod 4. Jig 14 to which the semiconductor substrate is anchored in Figure 3 is a metal material heavy enough to be heated. It is rectangular, with the corners on the side to which the semiconductor substrate is anchored cut at an angle of 40 to 80° to the top surface. Wedge-shaped grooves are formed in the center of the opposite sides.

[0011] Rotary polishing plate 15 in Figure 4 is a disk having three glass parts that radiate from the center to the outside. The remainder has a mesh. The mesh ranges from a coarse mesh to a fine mesh, and the glass part is transparent made of a quartz-like material. Rotary polishing plate 15 is anchored to shaft 3 of rotary motor 12 protruding into the center of columnar water receptacle 10 with the side with the mesh on top.
[0012] Once the semiconductor substrate has been anchored to the end face of jig 14 projecting somewhat below the base at the inclined side of jig 14, it is placed on anchored rotary polishing plate 15 by engaging the wedge-shaped grooves in the opposing side and serrations in jig stationary rod 14 engaged. Rotary polishing plate 15 is turned by rotary motor 12. Camera 13 monitors the surface of the inclined semiconductor substrate from underneath the rotary polishing plate using the transparent area that is formed when glass parts 16 in rotary polishing plate 15 turn. The motor is automatically shut down once it is detected that the side of the semiconductor substrate has reached the pre-set coordinates on the polishing position control lines.
[0013]
[Effect of the invention] As previously described, a jig to which the surface of a semiconductor substrate is anchored inclined (with the surface of the semiconductor substrate facing the rotary polishing plate surface) is placed on a rotary polishing plate with both mesh and transparent parts in the surface thereof and the surface of the semiconductor substrate is monitored from underneath the rotary polishing plate using the transparent part that is made when the transparent parts in the rotary polishing plate turn. When the side of the semiconductor substrate reaches the preset polishing stop point, the motor is automatically shut down. Therefore, it is possible to automatically reach the polishing stop point and to prevent exceeding the polishing stop point without calculating polishing time using optical microscopes or instrumentation. In addition, the present invention curtails polishing time and reduces the number of steps involved in polishing.

[Brief Description of the Drawings]
[Figure 1] is an oblique view of the semiconductor polishing device of the present invention.
[Figure 2] is the cross section along line A-A' of the semiconductor polishing device in Figure 1.
[Figure 3] is an oblique view of the jig of the present invention to which the semiconductor substrate is anchored.
[Figure 4] is an oblique view of the jig showing the rotary polishing plate of the present invention.
[Figure 5] is an oblique view showing a conventional semiconductor polishing device.
[Figure 6] is the cross section long line B-B' of the semiconductor polishing device in Figure 5.
[Figure 7] is an oblique view of a conventional jig to which a semiconductor substrate is anchored.
[Figure 8] is an oblique view showing a conventional rotary polishing plate.
[Key]
1. Semiconductor polishing device
2. Water inlet
3. Rotary motor shaft
4. Jig stationary rod
5. Display
6. Drive control button
7. Polishing position control button

8. RPM control button
9. Water control button
10. Columnar water receptacle
11. Drive controller
12. Rotary motor
13. Camera
14. Jig
16. Rotary polishing plate (transparent part)

[Figure 1]
[Figure 2]
[Figure 3]
[Figure 4]
[Figure 5]
[Figure 6]
[Figure 7]
[Figure 8]

POLISHING METHOD FOR SEMICONDUCTOR

Patent number: JP6037076
Publication date: 1994-02-10
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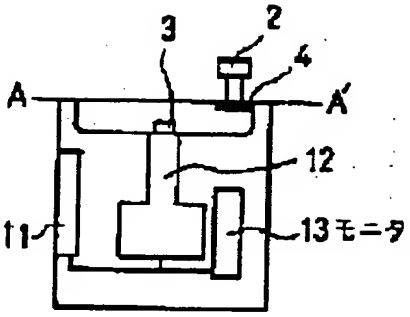
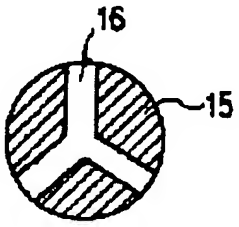
Classification:
- international: H01L21/304; B24B1/00; B24B49/04
- european:
Application number: JP19920188240 19920715
Priority number(s):

Abstract of **JP6037076**

PURPOSE:To prevent passage of a polishing ending ground point, to shorten a polishing time and to eliminate an optical microscope and a measuring instrument by monitoring a surface of a semiconductor substrate from below a rotary polishing plate by utilizing a transparent part to be formed by rotating a transparent part of the plate.
CONSTITUTION:A semiconductor substrate is fixed to an end face of a jig 14 slightly protruding from a bottom at the side of an oblique side face of the jig 14 on a fixed rotary polishing plate 15. Then, a wedge-shaped groove formed on an opposed side face and a threaded part of a saw of a jig fixing rod 4 are placed while engaging the groove with the threaded part. The plate 15 is rotated by a rotary motor 12. A camera 13 monitors a surface of the substrate inclined obliquely from below the plate by utilizing a transparent part formed by rotating a glass part 16 of the plate 15. An arrival of the side face of the substrate at coordinates of a preset polishing position control line is recognized, and the motor is automatically stopped.





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【特許請求の範囲】

【請求項1】　小片状の半導体基板の側面をモータの軸に取りつけられた回転研磨板に押さえつけて所定量研磨する半導体研磨方法において、前記半導体基板の板面形状をモニタし、あらかじめ設定した前記所定量を研磨したら前記モータの駆動を自動的に停止させることを特徴とする半導体研磨方法。

【請求項2】　前記半導体基板の板面は前記回転研磨板に斜めに対抗させて前記側面が押さえつけられ、前記回転研磨板は少なくとも一部に透明部を有しており、前記半導体基板の板面形状を前記回転研磨板下からモニタすることを特徴とする請求項1記載の半導体研磨方法。

【発明の詳細な説明】

【0001】

【産業上の利用分野】この発明は、半導体ウェハをダイシングしたあとの小片状の半導体基板の側面研磨する半導体研磨装置に関する。

【0002】

【従来の技術】図5に従来の半導体研磨装置の斜視図と、図6に図5のB－B'線に沿った断面図を示す。従来、図5の半導体研磨装置1は、本体上部には円柱型水受け皿10、注水口2、治具固定棒4があり、また内部には図6に示すように駆動制御器11、回転モータ12、円柱型水受け皿10の中心には回転モータ12の軸3が突起している。前面部には表示部5、駆動制御ボタン6、回転数制御ボタン8、注水制御ボタン9から形成されている。円柱型水受け皿10は、斜度をつけて水を外部に排出するようになっている。治具固定棒4は本体の一部から伸びた長方体で、側面に鋸山を形成する。表示部5は液晶ディスプレイで回転数を表示、回転数制御ボタン8で回転数を可変させ、回転数を駆動制御器11へ送る。駆動制御ボタン6で回転モータ12を駆動制御し、軸3を回転させる。注水制御ボタン9で、注水口2の開閉を行い、水は研磨時治具固定棒4付近に注水される。

【0003】図7は半導体材料を固定する治具の斜視図で、加熱可能な重みのある金属性材料を使用する。形状は長方体で、一側面の中央部に楔形溝を形成。図8の回転研磨板15は、円板型で全面にやすり目が存在する。やすり目は、荒い目から細かい目がある。また、石英等で形成されるガラス状の研磨板がある。半導体研磨板15は、円柱型水受け皿10中心に突起している回転モータ12の軸3に、やすり目がある面を上にし固定させる。

【0004】固定させた回転研磨板15上に、半導体基板の板面を治具14の底面より下に少しはみだして治具14の端面に固定させたのち、治具14側面の楔形溝と治具固定棒4の鋸山部分とを噛み合わせながら置く。回転研磨板15を回転モータ12で回転させ、半導体基板側面と回転研磨板を治具14の重量を利用して接触させ研磨する。

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【0005】

【発明が解決しようとする課題】しかしながら、上記のような半導体研磨装置では、研磨板の回転数、やすり目の種類の各々に応じて、あらかじめ単位あたりの研磨量を測定しておく必要があった。すなわち、最初に任意の回転数、時間で研磨し、研磨された距離を光学顕微鏡等で半導体基板板面を観察し測定する。この距離と回転数から研磨終了地点までの時間を算出しておく必要があった。また算出を誤り研磨終了地点を過ぎてしまうことがあった。また、これを防ぐために、研磨時間を小刻みに区切り、その都度半導体基板の研磨地点を光学顕微鏡等で確認して、研磨していたので、かなりの時間を費やしていた。

【0006】そこでこの発明は、研磨終了地点の通過防止、光学顕微鏡や計測器の不要、研磨時間の短縮を目的とする。

【0007】

【課題を解決するための手段】上記課題を解決するために、本発明はやすり目と透明部が共存する回転研磨板上に、半導体材料を斜めに（半導体基板板面が回転研磨板に向くよう）固定した治具を置き、回転研磨板の透明部が回転することによってできる透明なところを利用して、回転研磨板下から半導体基板板面をモニタする。

【0008】

【作用】上記のように構成された半導体研磨装置においては、モニタした半導体基板板面の映像を画像処理することにより、半導体基板の座標や存在を認識でき、予め設定した研磨終了地点の座標に半導体基板側面が到達したときに、自動的にモータの駆動を停止できることとなる。

【0009】

【実施例】図1に本発明による半導体研磨装置の斜視図を、図2に図1のA－A'線に沿った断面図を示す。図1の半導体研磨装置1は、本体上部には円柱型水受け皿10、注水口2、治具固定棒4、内部には図2に示すように駆動制御器11、回転モータ12、カメラ13、円柱型水受け皿10中心には回転モータ12の軸3が突起し、前面部には図1に示すように表示部5、駆動制御ボタン6、研磨位置制御ボタン7、回転数制御ボタン8、排水制御ボタン9から形成されている。円柱型水受け皿10は、斜度をつけ水を外部に排出するようになっている。治具固定棒4は、本体の一部から伸びた長方体で、側面に鋸山を形成する。表示部5はカメラで撮った映像が映しだされると同時に回転数や研磨位置制御ライン等も表示する。研磨位置制御ボタン7で研磨位置制御ラインを、また回転数制御ボタン8で回転数を可変させる。カメラ13でモニタした半導体基板板面の映像は、駆動制御器11に送り画像処理され、半導体基板の座標と存在を認識する。

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【0010】また、回転数、研磨位置制御ラインの座標は駆動制御器11へ送られる。駆動制御ボタン6で回転モータ12を駆動制御し軸3を回転させる。注水制御ボタン9で、注水口2の開閉を行い、水は治具固定棒4付近に注水される。図3の半導体基板を固定する治具14は、加熱可能な重みのある金属性材料を使用する。形状は長方体で、半導体材料を固定する側面のかどを上面に対し40～80度の角度で切断し斜度を形成、対抗する側面の中央部には楔形溝を形成する。

【0011】図4の回転研磨板15は、円板型で中心から外側へ放射状に3本ガラス部を設け、他はやすり目を存在させる。やすり目は、荒い目から細かい目のものを揃え、またガラス部は石英状の材質を使用し透明に形成する。回転研磨板15は、円柱型水受け皿10中心に突起している回転モータ12の軸3に、やすり目がある面を上にし固定させる。

【0012】固定させた回転研磨板15上に、半導体基板を治具14の斜度のある側面側に、底面より下に少しはみだして治具14の端面に固定させたのち、対抗する側面に形成されている楔形溝と治具固定棒4の鋸山部分とを噛み合わせながら置く。回転研磨板15を、回転モータ12で回転させる。カメラ13は、回転研磨板15のガラス部16が回転することにより形成される透明なところを利用して、回転研磨板下から斜めに傾けられた半導体基板板面をモニタする。あらかじめ設定した研磨位置制御ラインの座標に半導体基板の側面が達したことを認識して、自動的にモータの駆動を停止させる。

【0013】

【発明の効果】この発明は、以上説明したように、面内にやすり目と透明部が共存する回転研磨板上に、半導体基板を斜めに（半導体基板板面が回転研磨板面に向くよう）固定した治具を置き、回転研磨板の透明部が回転することによってできる透明なところを利用して、回転研磨板下から半導体基板板面をモニタし、予め設定した研磨終了地点に半導体基板板面が到達したときに、自動的

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にモータの駆動を止めるという構成としたので、光学顕微鏡や計測器を用いて研磨時間を算出することなく、研磨終了地点まで自動的に到達することができ、研磨終了地点通過をも防止できる。また、研磨時間の短縮と工数の軽減につながる。

【図面の簡単な説明】

【図1】本発明の半導体研磨装置の斜視図である。

【図2】図1の半導体研磨装置のA－A'線に沿った断面図である。

【図3】本発明の半導体基板を固定する治具の斜視図である。

【図4】本発明の回転研磨板を示した治具の斜視図である。

【図5】従来の半導体研磨装置を示した斜視図である。

【図6】図5の半導体研磨装置のB－B'線に沿った断面図である。

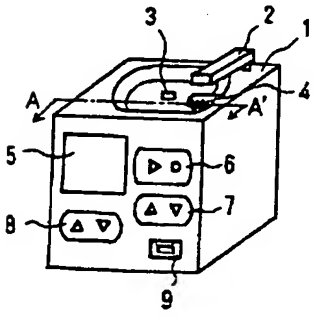
【図7】従来の半導体基板を固定する治具の斜視図である。

【図8】従来の回転研磨板を示した斜視図である。

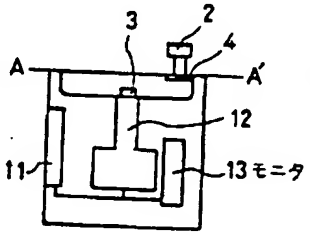
【符号の説明】

1　半導体研磨装置
2　注水口
3　回転モータ軸
4　治具固定棒
5　表示部
6　駆動制御ボタン
7　研磨位置制御ボタン
8　回転数制御ボタン
9　注水制御ボタン
10　円柱型水受け皿
11　駆動制御器
12　回転モータ
13　カメラ
14　治具
16　回転研磨板（透明部）

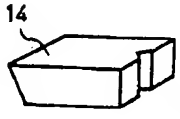
【図1】



【図2】



【図3】



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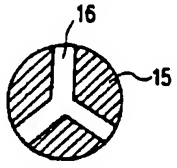

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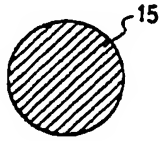

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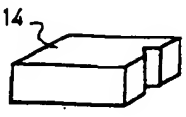

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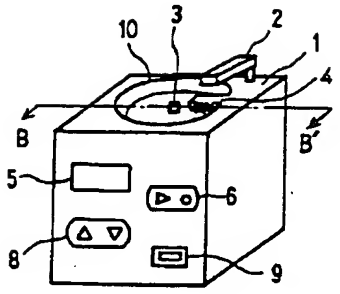

【図6】